REMARKS

Claims 1-19 are now pending in this application of which claims 11 and 15 are being amended. Claims 20 and 21 which were withdrawn from consideration by the Examiner, are being cancelled.

Claims 11 and 15 are being amended to change the "whereby" clause to a "wherein" clause.

Applicant affirms the election to prosecute the claims of Group I as defined by the Examiner, namely claims 1-19.

Objections to Drawings

The Examiner objected to the drawings as failing to comply with 37 C.F.R. § 1.84(p)(5), for not including reference number 34 in Figures 1 and 2. To overcome this objection, Applicant is submitting a replacement drawing sheet for Figures 1 and 2 that now depicts reference number 34.

Objections to Specification

The Examiner objected to the Specification because the first end 24 of hub 22 was incorrectly referred to as "first end 210" on page 7, line 14 of the application. Applicant has submitted a substitute paragraph correcting this inadvertent error.

Claim Rejections under 35 U.S.C. § 103(a)

To establish a *prima facie* case of obviousness under 35 U.S.C. 103(a), there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of the different references. Second, there must also be a reasonable expectation of success for such a combination. Also, the prior art references that are combined must teach or suggest all the claim limitations. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). "In making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention 'as a whole.'" Princeton Biochemicals, Inc. v. Beckman Coulter, Inc. (Fed. Cir., No. 04-1493, 6/9/05). "[S]imply identifying all of the elements in a claim in the prior art does not render a claim obvious. Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1275 (Fed. Cir. 2004). Instead, § 103 requires some suggestion or motivation in the prior art to make the new combination. In re Rouffet, 149 F.3d 1350, 1355-56 (Fed. Cir. 1998). In determining the differences between the prior art and the claims, the question under 35 U.S.C. §103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. Stratoflex, Inc. v. Aeroquip Corp., 713 F. 2d 1530, 218 USPQ 871 (Fed. Cir. 1983). The benefits of the claimed invention should be viewed without the benefit of impermissible hindsight vision afforded by the claims themselves.

Claims 1-6 and 8

The Examiner rejected claims 1-6 and 8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. ("Murugesh et al.") in view of U.S. Published Application No. 2003/0010451 issued to Tzu et al. ("Tzu et al.) and U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.").

Independent claim 1 is to a gas distributor capable of distributing a gas across surfaces in a substrate processing chamber. The gas distributor comprises a hub comprising a gas inlet and a gas outlet. The baffle having opposing first and second surfaces, extends radially outward from the hub. There are first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. The first vanes direct the received gas across a chamber surface and the second vanes direct the received gas across the second surface of the baffle.

As acknowledged by the Examiner, Murugesh et al. does not teach second vanes on the second surface of the baffle and where the second vanes direct the received gas across the second surface of the baffle. Instead, Murugesh et al. teaches a gas distributor having 215 having a surface 251 with ridges 245, as shown in FIGS. 2A and 2B. As seen from FIG 2A, the underside opposing surface to the surface 251 with the ridges 245, has no ridges. Thus, Murugesh et al. does not teach second vanes on the second surface of the baffle as claimed.

Tzu et al., however, fails to make up for the deficiencies of Murugesh et al.. Tzu et al. does not teach or suggest having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Tzu et al. teaches:

> The mixing lip 704 may include an optional sculptured surface 802 that directs the gas flow towards one another or induces turbulence to enhance mixing and/or cleaning. The sculptured surface 802 may includes [sic] any one or combination of turbulence inducing features such as one or more bumps, grooves, projections, indentations, embossed patterns and the like.
> (Tzu et al., paragraph [0039], lines 2-8.)

However, Tzu et al. only teaches the sculptured surface to be present on one surface of the mixing lip, and not the opposing surface. Tzu et al. teaches the opposing surface of the baffle to be flat and smooth. (Tzu et al., Figs. 3, 4, 5A, 6, 7 and 8.) Thus, Tzu et al. does not teach a baffle having vanes on both opposing surfaces of the baffle. Therefore, Tzu et al. does not teach or suggest a gas distributor having a baffle with

opposing first and second surfaces, and with first vanes on the first surface of the baffle and second vanes on the second surface of the baffle, as claimed.

Further, the Examiner acknowledges that Tzu et al. does not teach the second vanes that direct the received gas across the second surface of the baffle.

Halsey et al. fails to make up for the deficiencies of Murugesh et al. and Tzu et al. because Halsey et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.)

Therefore, the combination of Murugesh et al., Tzu et al. and Halsey et al. do not provide the suggestion or motivation to teach the gas distributor of independent claim 1. As explained in the Specification, the claimed gas distributor has second vanes to flow gas across the second surface of the baffle so that the gas flows uninhibited into the process chamber. The flow of gas across the second surface of the baffle cleans this surface, and thus, the gas distributor is self cleaning. This self-cleaning action is especially useful as the second surface is susceptible to the build-up of process residues because it generally faces the substrate in the chamber and is thus proximate to a process zone in which processes are concentrated in the chamber. This is a significant advantage over prior art gas distributors which have allowed build-up of residues on surfaces exposed to the plasma or process gas environment in the chamber, and which were not exposed to direct flow streams of cleaning gas.

Thus, for the reasons presented above, claim 1 and the claims dependent directly or indirectly therefrom, are not rendered unpatentable by Murugesh et al. in view of Tzu et al. and Halsey et al.. Accordingly, the Examiner is respectfully requested to allow claim 1 and the claims dependent directly or indirectly therefrom.

Claim 7

The Examiner rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. ("Murugesh et al.") in view of U.S. Published Application No. 2003/0010451 issued to Tzu et al. ("Tzu et al.) and U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") as applied to claim 1 and further in view of U.S. Published Application No. 2003/0116278 issued to Wheat et al. ("Wheat et al.).

Dependent claim 7 is to a gas distributor according to claim 1 wherein the second vanes comprise a plurality of wedges. As discussed above with respect to claim 1, Murugesh et al., in view of Tzu et al. and Halsey et al., does not render claim 1 unpatentable.

Wheat et al. fails to make up for the deficiencies of Murugesh et al., Tzu et al. and Halsey et al. because Wheat et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the opposing second surface of the baffle. Instead, Wheat et al. teaches "...an angular gas baffle or deflector 34 which is show in FIG.1 as having an open generally trapezoidal or 'hooded' configuration or shape." (Wheat et al., paragraph [0032], lines 1-4.) Further, the gas baffle in Wheat et al. has smooth surfaces without any vanes. (Wheat et al., Figs. 1 and 2.)

Therefore, the combination of Murugesh et al., Tzu et al., Halsey et al. and Wheat et al. do not provide the suggestion or motivation to teach the gas distributor of independent claim 1 which claim 7 depends therefrom. Thus, for the reasons presented above, dependent claim 7 is not rendered unpatentable by Murugesh et al. in view of Tzu et al., Halsey et al. and Wheat et al.. Accordingly, the Examiner is respectfully requested to allow dependent claim 7.

Claims 9 and 15-19

The Examiner rejected claims 9 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. ("Murugesh et al.") in view of U.S. Published Application No. 2003/0010451 issued to Tzu et al. ("Tzu et al.) and U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") as applied to claim 1 and further in view of U.S. Published Application No. 2004/0200412 issued to Frijlink ("Frijlink").

Dependent claim 9 is to a gas distributor according to claim 1 wherein the hub comprises a gas feed-through tube capable of allowing a process gas to bypass the first and second vanes and enter the chamber. As discussed above with respect to claim 1, Murugesh et al., in view of Tzu et al. and Halsey et al., does not render claim 1 unpatentable.

Frijlink fails to make up for the deficiencies of Murugesh et al., Tzu et al. and Halsey et al. because Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the opposing second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to "prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers." (Frijlink, paragraph [0027], lines 1-4.) "A cylindrical isolation element referred [sic] to as outer ring 10." (Frijlink, paragraph [0028], lines 1-2.) Frijlink further teaches:

> "...seal means are small grooves or roughened zones of surfaces of the interfaces of the isolation elements above-described. In the embodiment of FIG. 1, the seal means structures are applied to the flat contact surfaces of the outer ring 10 at the interfaces with the cover plate 20 and the base plate 30. The seal means structures according to the invention avoid the processing gases from existing through said interfacees, and force said process gas through the outlets 12 and then through the exhaust plenum 29. These seal means do not allow

those process gases to enter the spaces 102, 103."

(Frijlink, paragraph [0032], lines 1-11.)

Thus, Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

Independent claim 15 is to a substrate processing apparatus comprising a remote chamber to activate a gas and a process chamber comprising chamber walls, interior chamber surfaces, a substrate support, a gas distributor, and a gas exhaust. The gas distributor is capable of receiving the gas from the remote chamber and distributing the gas into the process chamber along the chamber walls and interior chamber surfaces, and about the gas distributor. The gas distributor comprises a hub comprising a gas inlet, a gas outlet, and a gas feed-through tube. The gas distributor further comprises a baffle having opposing first and second surfaces. The baffle extends radially outward from the hub. The baffle has first vanes on the first surface and second vanes on the second surface. The first vanes direct the gas across the enclosing walls and interior chamber surfaces. The second vanes direct gas across the second surface of the baffle The gas feed-through tube allows a gas to bypass the first and second vanes.

As acknowledged by the Examiner, Murugesh et al. does not teach second vanes on the second surface of the baffle and where second vanes direct the received gas across the second surface of the baffle.

Tzu et al., however, fails to make up for the deficiencies of Murugesh et al.. Tzu et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Tzu et al. teaches:

> The mixing lip 704 may include an optional sculptured surface 802 that directs the gas flow towards one another or induces turbulence to enhance mixing and/or cleaning. The sculptured surface 802 may includes [sic] any one or combination of turbulence inducing features such as one or more bumps,

grooves, projections, indentations, embossed patterns and the like.

(Tzu et al., paragraph [0039], lines 2-8)

However, Tzu et al. only teaches the sculptured surface to be present on one surface of the mixing lip, and not the opposing surface. Specifically, Tzu et al. teaches the surface of one side of the baffle to be flat and smooth. (Tzu et al., Figs. 3, 4, 5A, 6, 7 and 8.) Thus, Tzu et al. teach or suggest the a baffle having vanes on each surface of opposing sides of the baffle.

Further, the Examiner acknowledges that Tzu et al. does not teach second vanes that direct the received gas across the second surface of the baffle.

Halsey et al. fails to make up for the deficiencies of Murugesh et al. and Tzu et al. because Halsey et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.)

As presented above, Frijlink fails to make up for the deficiencies of Murugesh et al., Tzu et al. and Halsey et al. because Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation means to "prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers." (Frijlink, paragraph [0027], lines 1-4.) "A cylindrical isolation element referred [sic] to as outer ring 10." (Frijlink, paragraph [0028], lines 1-2.) Frijlink further teaches:

> "...seal means are small grooves or roughened zones of surfaces of the interfaces of the isolation elements above-described. In the embodiment of FIG. 1, the seal means structures are applied to the flat contact surfaces of the outer ring 10 at the interfaces with the cover plate 20 and the base plate 30. The seal means structures according to the invention avoid the processing gases from

existing through said interfacees, and force said process gas through the outlets 12 and then through the exhaust plenum 29. These seal means do not allow those process gases to enter the spaces 102, 103."

(Frijlink, paragraph [0032], lines 1-11.)

Thus, Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

For these reasons, independent claim 15 and the claims dependent therefrom, claims 16-19, are patentable over Murugesh et al., Tzu et al., Halsey et al. and Frijlink.

Claim 10

The Examiner rejected claim 10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,450,117 issued to Murugesh et al. ("Murugesh et al.") in view of U.S. Published Application No. 2003/0010451 issued to Tzu et al. ("Tzu et al.) and U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") as applied to claim 1 and further in view of U.S. Patent No. 6,132,512 issued to Horie et al. ("Horie at al.")

Claim 10 is to a combination process and cleaning gas distributor comprising the gas distributor according to claim 1 to distribute a cleaning gas. The process gas distributor has a process gas inlet and a showerhead gas distribution faceplate.

Claim 10 is dependent on claim 1. Claim 1 is patentable over the combination of Murugesh et al., Tzu et al. and Halsey et al. because none of these references by themselves or in combination provide the suggestion or motivation to teach the gas distributor of independent claim 1, as presented above with respect to arguments made on behalf on independent claim. Specifically, none of these

references teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

Horie et al. fails to make up for the deficiencies of Murugesh et al., Tzu et al. and Halsey et al. because Horie et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Horie et al. teaches "a gas ejection head for use in a vapor-phase thin-film growth apparatus, comprising a planar nozzle head body having a plurality of nozzle orifices for uniformly ejecting a film deposition therethrough." (Horie et al., Col. 4, lines 54-57.) Horie et al. further teaches:

> "...the gas injection head includes a nozzle head body 20 which comprises a disk 21 having a plurality of parallel fitting grooves 21a defined in an upper surface thereof and a plurality of parallel fitting grooves 21a defined in a lower surface thereof. The fiiting grooves 21a defined in the upper and lower surfaces of the disk 21 extend perpendicularly to each other. Slender liquid passage members 22, each having a channel-shaped cross section defining a liquid passage groove 23, are fitted in the respective fitting grooves 21a defined in the upper and lower surfaces of the disk 21, with the liquid passage grooves 23 opening toward the bottoms of the fitting grooves 21a."
>
> (Horie et al., Col. 8, line 59 to Col. 9, line 3 and Fig. 8A, 8B and 8C)

Thus, Horie et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

Claims 11-14

The Examiner rejected claims 11-14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,182,602 issued to Redeker et al. ("Redeker et al.") in view of U.S. Patent No. 6,450,117 issued to Murugesh et al. ("Murugesh et al."), U.S. Published Application No. 2003/0010451 issued to Tzu et al. ("Tzu et al.), U.S. Patent No. 6,663,025 issued to Halsey et al. ("Halsey et al.") and U.S. Published Application No. 2004/0200412 issued to Frijlink ("Frijlink").

Independent claim 11 is to a gas distributor to distribute a gas from an external source across surfaces in a substrate processing chamber having a wall with a cavity. The gas distributor comprises a hub that fits into the cavity in the wall of the chamber and a baffle plate extending radially outward from the hub. The hub comprises a plurality of first channels on an external surface of the hub that mates with the cavity. The first channels comprise openings and a terminus. The openings are capable of receiving the gas from the external source. The hub further comprises a plurality of second channels capable of receiving the gas from the terminus of the first channels, and a gas feed-through tube. The baffle plate comprises a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels. There are first vanes on the first surface of the baffle plate. Each first vane comprises an arcuate plate that curves outward from the hub. The first vanes direct gas across the surfaces of the chamber. There are second vanes on the second surface of the baffle plate. Each second vane comprises a surface inclined to the second surface of the baffle plate. The second vanes direct the gas across the second surface of the baffle plate. The gas feed-through tube allows the gas to bypass the first and second set of vanes.

As acknowledged by the Examiner, Redeker et al. does not teach a "first channel along external surface of hub; a baffle plate extending radially outward from the hub, the baffle plate comprising a first and second surface, an outer perimeter, and an aperture capable of allowing passage of the gas along the second channels; first vanes on the first surface of the baffle plate, each first vane comprising an arcuate plate that curves outward from the hub, second vanes on the second surface of the baffle plate, each second vane comprising a surface inclined to the second surface of the baffle plate; whereby the first vanes direct the gas across the surfaces of the chamber, the second vanes direct the gas across the second surface of the baffle plate, and the (iii) a gas feed-through tube that allows the gas to by pass the first and second set of vanes."

As further acknowledged by the Examiner, Redeker et al. in view of Murugesh et al. does not teach second vanes on the second surface of the baffle and where second vanes direct the received gas across the second surface of the baffle.

Tzu et al., however, fails to make up for the deficiencies of Murugesh et al., as discussed above with respect to independent claim 1. Tzu et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Tzu et al. teaches:

> The mixing lip 704 may include an optional sculptured surface 802 that directs the gas flow towards one another or induces turbulence to enhance mixing and/or cleaning. The sculptured surface 802 may includes [sic] any one or combination of turbulence inducing features such as one or more bumps, grooves, projections, indentations, embossed patterns and the like.
> (Tzu et al., paragraph [0039], lines 2-8)

However, Tzu et al. only teaches the sculptured surface to be present on one surface of the mixing lip, and not the opposing surface. Specifically, Tzu et al. teaches the surface of one side of the baffle to be flat and smooth. (Tzu et al., Figs. 3, 4, 5A, 6, 7 and 8.) Thus, Tzu et al. teach or suggest a baffle having vanes on each surface of opposing sides of the baffle.

Halsey et al. fails to make up for the deficiencies of Murugesh et al. and Tzu et al. because Halsey et al. does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Halsey et al. teaches a diffuser with guide vanes on the surface of one side of the diffuser and a smooth and flat surface on the opposing side of the diffuser. (Halsey et al., Figures 4A and 4B.)

As presented above, Frijlink fails to make up for the deficiencies of Murugesh et al., Tzu et al. and Halsey et al. because Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle. Instead, Frijlink teaches a process chamber with isolation

means to "prevent the reactive gases from flowing into spaces of the reactor other than the space immediately above the substrate holders and the wafers." (Frijlink, paragraph [0027], lines 1-4.) "A cylindrical isolation element referred [sic] to as outer ring 10." (Frijlink, paragraph [0028], lines 1-2.) Frijlink further teaches:

> "...seal means are small grooves or roughened zones of surfaces of the interfaces of the isolation elements above-described. In the embodiment of FIG. 1, the seal means structures are applied to the flat contact surfaces of the outer ring 10 at the interfaces with the cover plate 20 and the base plate 30. The seal means structures according to the invention avoid the processing gases from existing through said interfacees, and force said process gas through the outlets 12 and then through the exhaust plenum 29. These seal means do not allow those process gases to enter the spaces 102, 103."
>
> (Frijlink, paragraph [0032], lines 1-11.)

Thus, Frijlink does not teach or suggest a baffle having first vanes on the first surface of the baffle and second vanes on the second surface of the baffle.

For these reasons, independent claim 11 and the claims dependent therefrom, claims 12-14, are patentable over Redeker et al. in view of Murugesh et al., Tzu et al., Halsey et al. and Frijlink.

CONCLUSION

For the foregoing reasons, allowance of the instant application is respectfully requested. Should the Examiner have any questions regarding the above amendments or remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,
JANAH & ASSOCIATES, P.C.

Date: May 24, 2006

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